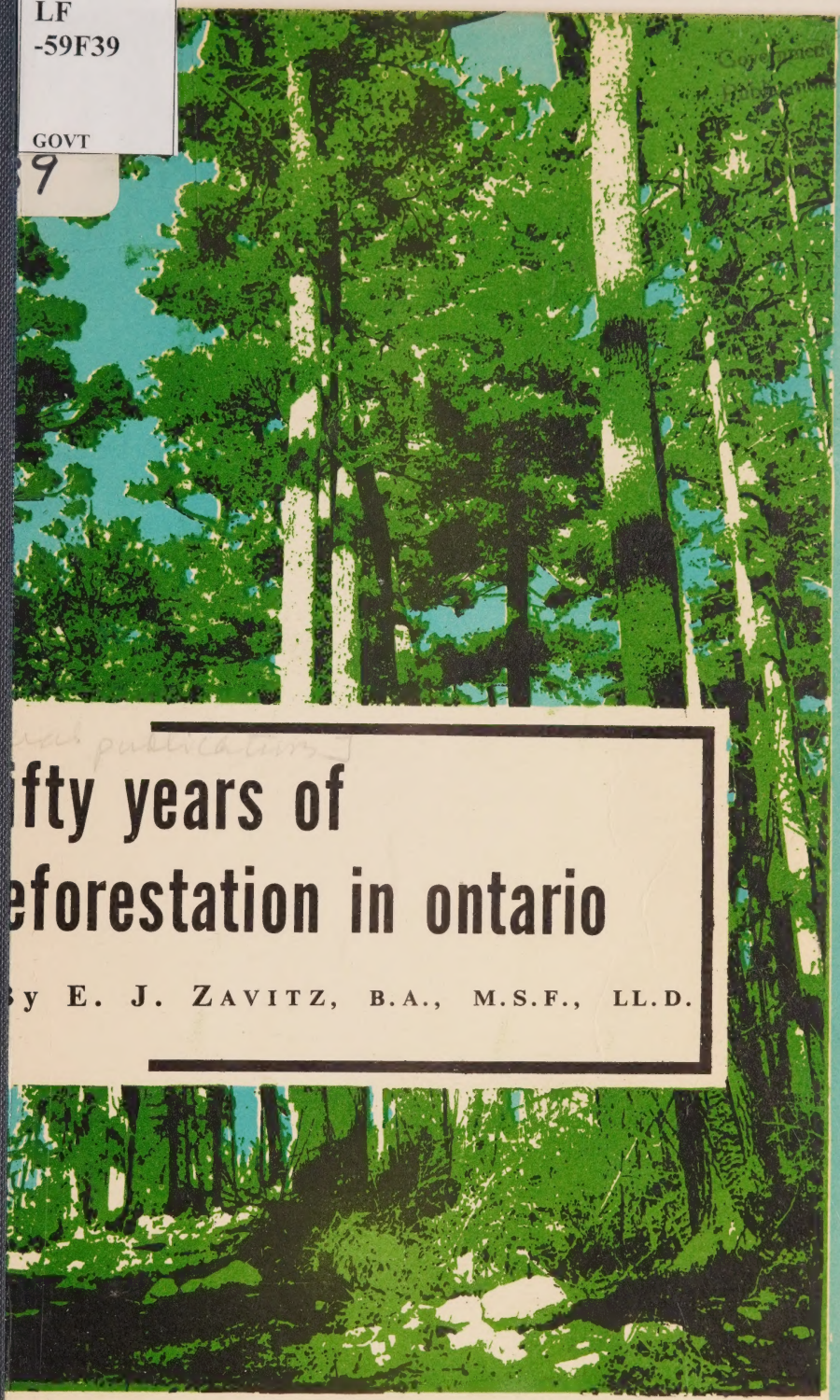

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By E. J. ZAVITZ, B.A., M.S.F., LL.D.

ARIO DEPARTMENT OF
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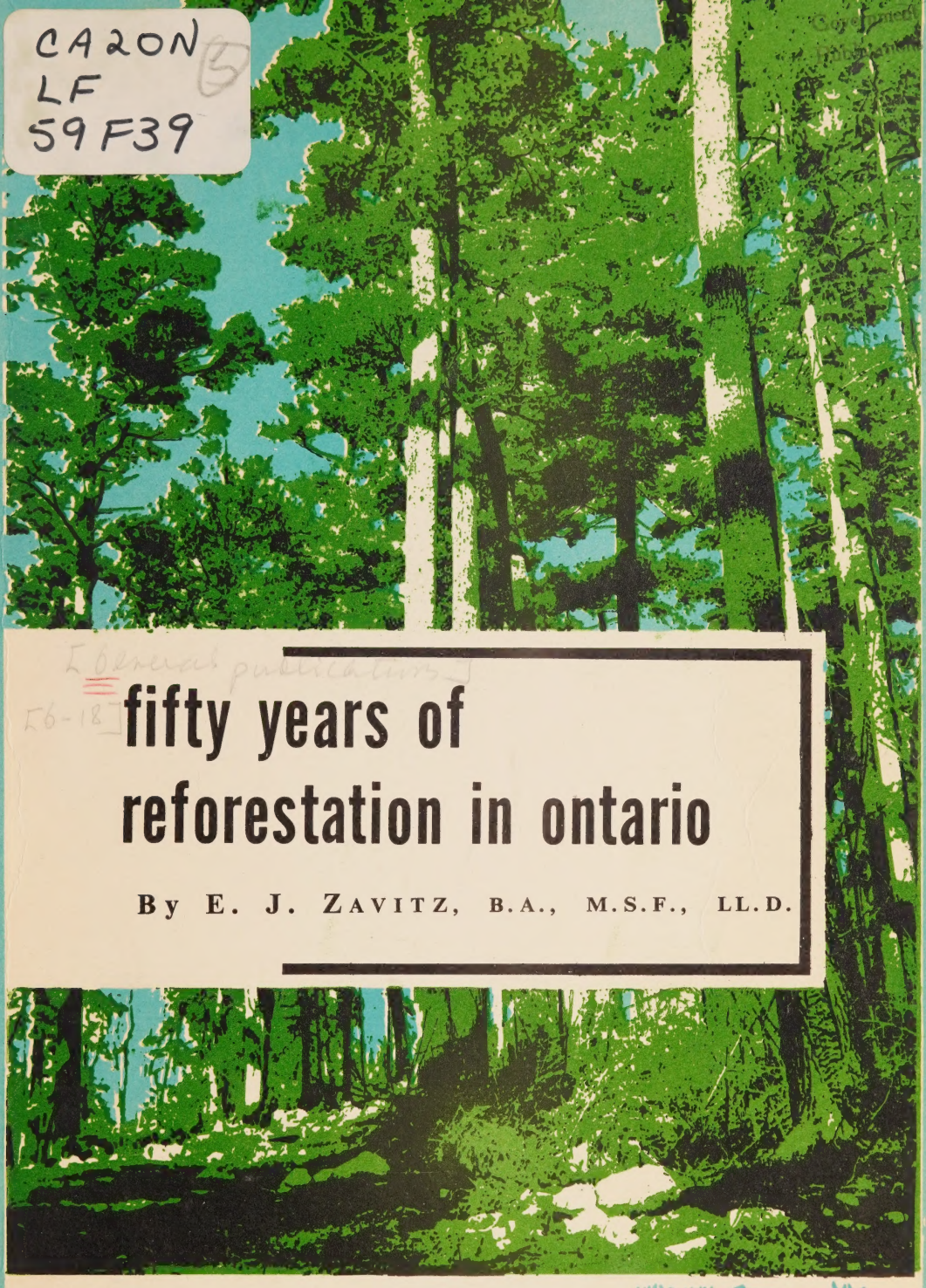

# fifty years of reforestation in ontario

By E. J. ZAVITZ, B.A., M.S.F., LL.D.

ONTARIO DEPARTMENT OF
LANDS AND FORESTS

HON. J. W. SPOONER
Minister

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Deputy Minister

ONTARIO

# INTRODUCTION

By the end of the 19th century Ontario had nearly exhausted the finest stands of white pine, much of which had taken 200 to 300 years to develop. During that century the best of the white pine, as square timber, had floated. down the Ottawa and St. Lawrence Rivers to be loaded into vessels destined for Great Britain. The beginning of the 20th century began the manufacture of pulp from spruce. By degrees lower grades of white pine came into the market and other species became a factor in the production of pulp.

By 1900, through fire and misguided settlement for farming, many areas had reverted into waste barrens. These idle lands are a burden on the municipalities, as they have little or no assessable value. Census figures show an alarming decrease in the "occupied farm land" in many parts of Ontario.

It is interesting to realize that there are at least 160,000 acres of public lands composed of Municipal, Authority, and Crown lands that are being reclaimed by reforestation.

While it has taken half a century to accomplish these results, it is now possible with increased forest nursery capacity and experienced organization to reduce the area of waste and idle lands.

With fifty years of reforestation experience, the following publication with its illustrations and financial statements should make us realize the importance of reclaiming the barren areas of the Province.

J. W. Spooner
Minister of Lands and Forests

During the early pioneer days, wood played a very important part in the economy of Southern Ontario. The dominant thought was not forest conservation, but how the land should be cleared. The Canadian Almanac in 1856 has a well written article on the resources of Canada, in which the following paragraph occurs:

> North of the 44 - 30' parallel, is a mixed mineral and timber region where are millions of acres in the valleys of the tributaries of the Ottawa and the rivers flowing into Lake Huron, capable of yielding a rich harvest of lumber for a century to come.

Southern Ontario has been cleared and tilled for less than one hundred and fifty years--a short space in the life of a nation--and yet we are confronted with many serious problems of soil and water, owing to the lack of forest cover.

Gradually the opinion developed that the forest was being cleared with no thought of the future. On June 22nd, 1871, Sir John Macdonald, Prime Minister of Canada, in a letter written to Hon. J. S. Macdonald, Premier of Ontario, says, amongst other things: "We are recklessly destroying the timber of Canada, and there is scarcely a possibility of replacing it."

We quote from the Report of the Fruit Growers' Association of Ontario for 1879:

> The Fruit Growers' Association need to put forth their best efforts to husband our Dominion and Provincial resources in their timber limits--to carefully instruct the farming community how much depends on the judicious planting of forest trees, their presence producing abundant rainfall, preserving and distributing moisture and thereby forming a preventative against drought and devastating floods.

In 1900 a forestry committee was appointed at the Ontario Agricultural and Experimental Union, an organization largely interested in the improvement of crops and general improvement of agriculture. In 1902 this committee passed a resolution, moved by Mr. Nelson Monteith of Stratford, Ontario, and seconded by Mr. E. C. Drury of Crown Hill, Ontario, as follows:

> The Experimental Union, recognizing the urgent necessity for action in the reforesting of the waste lands throughout Old Ontario, would recommend that the Department of Crown Lands be requested to provide material sufficient to reforest areas

sufficiently large to provide forest conditions in typical situations throughout Ontario, the Union undertaking to supervise the distribution.

By 1904 the Government decided to establish a forest nursery at the Ontario Agricultural College, Guelph. In 1905 the writer was appointed as Lecturer in Forestry to give lectures in farm forestry, to produce forest nursery stock, and to carry on extension work with landowners.

In the period 1905 to 1908 the writer visited and examined some of the areas referred to in the Resolution of the Experimental Union at Guelph in 1902. The findings of these studies were reported to the Government in a Memorandum which became the "Reforestation of Waste Lands of Southern Ontario 1908."

At this time a decision was made to transfer the small nursery at Guelph to one of the submarginal areas described in the 1908 Report. This would provide enlarged nursery expansion and low cost land in order to develop demonstration forest plantations. This was the origin of the first Provincial Forest Station in Ontario.

In 1912 the extension work in reforestation was transferred from the Department of Agriculture to that of the Department of Lands and Forests

The following publication gives a reprint of the 1908 Report in the first part, followed in the second part by the development and results of the past 50 years in reforestation.

No details of methods in reforestation such as seed-collection, nursery production, planting, etc., are given in this publication. These phases are well described in The Canadian Geographical Magazine in an article by G. H. Bayly "Reforestation in Ontario 1955", which is available in a reprint at the Department of Lands and Forests, Parliament Buildings, Queens Park, Toronto.

In the Report of 1908 little reference was made to the conditions existing in Northern Ontario. At that time it was felt that the state of forest fire protection was not well enough developed to risk a program of reforestation. In 1928 a circular letter was sent to the northern district offices, the results of which will be described in part two of this publication.

In the 1908 Report some predictions were made concerning the financial results of reforestation. After 50 years it is now possible to give more reliable results as there are many forest plantations of 25 to 50 years of age. These results will be dealt with in a statement in part two of this publication.

We quote from the last paragraph of the 1908 Report: "The policy of putting these lands under forest management has many arguments in its favour. It will pay as a financial investment; assist in insuring a wood supply; protect the headwaters of streams; provide breeding grounds for wild game; provide object lessons in forestry and prevent citizens from developing under conditions which can only end in failure."

REPORT

ON THE

# Reforestation of Waste Lands

IN

# Southern Ontario

1908

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO
Printed by L. K. CAMERON, Printer to the King's Most Excellent Majesty
1909

To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc., etc.,
*Lieutenant-Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for the consideration of your Honour the Report on the Reforestation of Waste Lands in Southern Ontario.

Respectfully submitted,

JAMES S. DUFF.

*Minister of Agriculture.*

TORONTO, 1909.

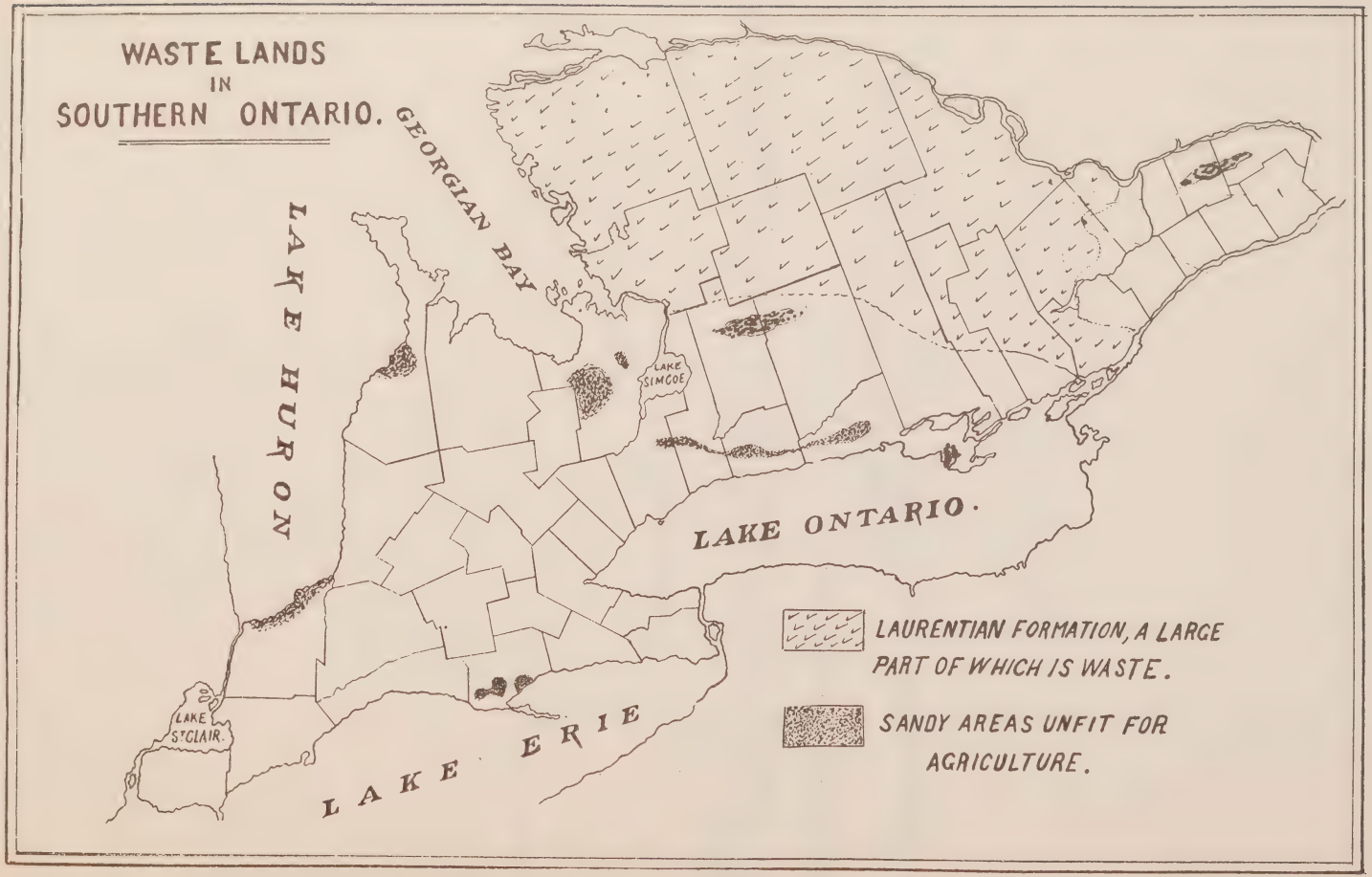


FIG. 1. Waste Lands in Southern Ontario.

# REPORT

ON THE

# Reforestation of Waste Lands in Southern Ontario

## INTRODUCTION.

This report deals with the forest problem of Southern Ontario, that portion of the Province as shown in figure 1. The disappearance of the forest and woodlot throughout this region is a topic which has been widely and frequently discussed. Early in the eighties we find reports which were compiled at the instance of the Ontario Government, calling attention to the necessity of preserving and replanting forests in this region. Little heed was given to these reports so far as the adoption of any policy was concerned. We had not yet heard of such phrases as "timber famine prices." It seemed as though there existed inexhaustible supplies of white pine, and the manufacturers were still able to obtain, from Ontario sources, the greater part of their hardwood supply, which to-day is largely imported from the United States.

We have in Ontario two classes of lands which should be permanently managed for forest crops. First, there are the small isolated patches of non-agricultural soils to be found throughout otherwise good farm lands. These are sand, gravel or rock formations, steep hillsides, etc. The reclamation of these denuded and unimproved soils must depend upon local initiative, although Government assistance of an educational nature is advisable. The Department of Agriculture's co-operative distribution of planting material aims to assist the farmer in reforesting these waste soils. Second, there are the large, contiguous areas of non-agricultural soils which exist in many parts of the Province. Some of the most important areas are shown on map in figure 1.

This older portion of the Province is divided into two general classes of soil. The Laurentian formation indicated in figure 1, contains large areas unfit for agriculture. Much of this area consists of rocky out croppings with a soil lacking in lime, thus not naturally adapted to agriculture. This region contained magnificent white and red pine, with yellow (or black) birch, sugar maple and a number of other hardwoods. Much of the valuable white and red pine has been taken out of this area, and a large portion of this country has been badly burned. It is interesting to note that this Laurentian formation forms one of the important watersheds of Ontario.

Within this watershed are two areas reserved from settlement. Preservation of game, protection to the headwaters of streams and future wood supply were the chief arguments used in favour of making these reservations. Algonquin National Park was created a park or reserve by special Act of Parliament in 1893. It is a contiguous tract of land in the district of Nipissing, south of the Mattawa River, and contains a little over one million acres. This reservation embraces the headwaters of the Muskoka, Madawaska, Petewawa and other streams.

In 1899 another area on the watershed was reserved known as the Eastern Reserve and consisting of about 80,000 acres in the rear of the counties of Frontenac and Lennox and Addington. This was the first reserve created by Order-in-Council under the Forest Reserves Act of 1898.

The southern portion of older Ontario, with its rich agricultural lands, is chiefly a glacial deposit on limestone formation. It was originally covered with heavy forest. On the light, sandy soils white and red pine were the chief species, and in the better classes of soil many of the valuable hardwoods formed the forest growth. In the most southerly or Lake Erie portion existed splendid specimens of white ash, white wood, chestnut, black walnut, hickories, white oak, black cherry, etc. Remnants of stumps and a few large specimens still left testify to the character of the original growth in this old, agricultural part of Ontario.

To a large extent the only woodland left, in this settled portion of the Province, is the farmer's woodlot. At least forty-five townships have as low as five per cent. of woodland. In 1904 the municipal assessors' returns gave less than fifteen per cent. of woodland for all the settled townships.

How many realize what the character of the growth is in a large proportion of this remaining woodland? It is practically impossible to buy, in any district in Ontario, commercial quantities of any of the more valuable hardwoods as white ash, rock elm, hickory, etc. Through severe culling, and opening the woodlot to cattle, much of the remaining woodlands are only remnants, with either defective or undesirable trees left.

The forest problem on private lands includes the better management of existing woodlands along with the replanting of waste portions of untillable soils. This will always be a most difficult problem. Private management of small parcels of forest land in older countries, as France and Germany, where the science of forestry has long been practised, is still very unsatisfactory. Owing to the long time element in maturing wood crops private management is too often weak and uncertain.

As indicated on the map in figure 1, we have throughout the older parts of the Province large bodies of sand lands which are not suited for agriculture. It is generally admitted, that these waste lands can be made permanently productive only by being managed for timber crops.

The only solution of this waste land problem is in a policy which has as its aim the gradual segregation of these lands, to be permanently managed as Provincial forests.

## DESCRIPTIVE.

Before indicating reasons for adopting any policy, the following brief description of some of the non-agricultural lands in Southern Ontario will give the reader a general conception of existing conditions. The location of these areas may be seen on the map in figure 1, although the areas may not be proportionately exact.

### Norfolk County.

Norfolk County contains two definite areas of sand lands unfit for agriculture, one being in Walsingham Township and the other in Charlotteville Township. It is quite safe to say that there are 10,000 acres in two contiguous areas, which must be finally placed under forest management.

Fig. 2. Scene at the border of the sand plains in Charlotteville Township.

Fig. 3. Normandale Plains in Charlotteville Township.

Early settlements began in Walsingham about 1791 and in Charlotteville in 1796. It is interesting to note that the first township is not yet wholly settled, as the Canada Company still holds land in the Township of Walsingham.

These lands originally produced splendid white pine, oak, chestnut and other valuable hardwoods. Where the land was cleared for farming purposes it gave at first, in many cases, good returns. As soon as the vegetable mould or old forest soil disappeared from the sand, it became a difficult matter to keep up the fertility and we find conditions as in the following illustrations:

Charlotteville Township contains a large proportion of this blow-sand type. There are several hundred acres which are gradually developing into sand dune formations. The area is increasing and preventive measures should be adopted in the near future. It is quite possible to reforest these areas, but the cost will be higher than on lands as shown in figure 3.

Figure 3 shows one type of waste land in Norfolk County. The area is covered with scrub oak and scattering white pine. The oak is chiefly yellow and red (*Quercus velutina* and *rubra*). Its dwarfed scrubby appearance is owing to poor soil conditions caused from frequent ground fires, and also owing to the fact that as soon as a tree reaches three or four inches in diameter it is cut for fuel wood. Ground fires periodically burn over this land. The old scrubby white pine and oak usually withstand these ground fires, but the young pine is killed. If fire were kept out, a large proportion of the area would reproduce with white pine. The scrub oak is a valuable asset to this land as it gives protection to the soil and improves it by adding a leaf litter.

In figure 4 we have land which was cleared for agriculture. This land has been ploughed and cropped, but the owner did not succeed in removing the stumps. The size and number of the stumps indicate what is possible on this land, under forest management. The sand dune forming in the background indicates what will eventually happen under agricultural management.

If forest management is applied at once it will be possible to reclaim this area at a low cost. If neglected it will soon develop conditions as shown in figure 2.

Figure 5 shows some remains of the forest which existed on these Walsingham lands. These soils, which dry out on the surface, and are thereby of little value for most agricultural crops, have abundance of moisture below the surface. As may be seen in figure 5 the roots of the white pine reach down and find the moisture.

Figure 6 illustrates a type, which forms a large proportion, of the Walsingham waste lands. After the lumberman took off the pine, fire followed, and to-day we have scrub oak with scattering white pine. If the ground fires were prevented these lands would naturally fill up with white pine. Considerable fence, post and fuel wood material could be taken at a profit from such areas. Such cutting should always be done, looking forward to a new growth of white pine on the high, poor sites. In the low areas, where better soil conditions exist, management should aim at producing hardwoods. In the swales throughout this area we find the hardwoods represented by oak, chestnut, white ash, various maples, cherry, hickory, walnut, etc. It will be very advisable, wherever soil conditions will permit, to aim for hardwood reproduction as the hardwood supply in Ontario will be a serious problem in the future.

FIG. 4. Blow sand area just forming in Walsingham Township.

FIG. 5. Near view of effects of clearing sand lands.

### Lambton County.

In Lambton County, along the shore of Lake Huron, there is a belt of sand formation several miles in length, and varying in width from one-half mile to two miles. Considerable of this area is still held by the Canada Company. Practically no agricultural settlement has been attempted in this belt as the formation is largely a series of sand hills.

Figure 7 gives a general view of conditions existing in the Lambton County sand lands. As may be seen there is enough second growth existing. if protective measures were adopted, to secure good forest conditions. Notice the sand dune on the left side of the picture. This is pure sand and not a snow scene, as might be imagined.

The forest growth on these lands is chiefly red pine with scattering white pine. In the protected portions, where soil conditions are better, the important hardwoods are found. It is interesting to note that in this area is found the chestnut oak (*Quercus acuminata*), a species found only in the extreme southwestern portion of Ontario.

The shifting sand soon kills red and white pine, but there are some species, as shown in figure 8, which withstand the sand for a long time. Balsam poplar and sand willows, although gradually being covered by sand, send out new root systems and manage to keep their heads above the sand. Arbor vitæ or white cedar and the dwarf or trailing juniper are the only evergreens which seem able to withstand the sand. Another plant which plays an important part in holding the sand is a beach grass which may be seen in the foreground of figure 8. In protecting and reclaiming these areas these plants should play an important part.

Much of this Lambton County area presents a problem of protection rather than one of reforesting. Figure 10 shows an old scrubby red pine which is rapidly restocking the surrounding ground with young growth.

### Simcoe County.

Simcoe County has at least three sand areas, all of which are of a different type from those previously described, the chief difference is that the sand seldom blows or shifts owing to its being coarser grained than the Norfolk or Lambton sands.

Figure 11 represents the pine plains near Angus. There is at least 50,000 acres in this district occupying parts of the Townships of Tossorontio, Essa and Sunnidale. This area produced some of the finest red pine ever cut in Canada. Several splendid streams flow through this district, and it is well suited for a game preserve as well as a wood producing proposition.

Here again fire protection is the problem rather than reforesting A large proportion of the area has old scrubby seed trees of red and white pine which would soon give a splendid reproduction if it were not for the ever recurring ground fires. This autumn (1908) ground fires swept over a large tract near Angus.

Figure 12 shows the dead trees killed from ground fires which periodically sweep over these lands. Many under-estimate the damage done by these fires. They impoverish the soil by burning up the small amount of leaf litter and other materials which should go to form humus. Many of these fires destroy young seedling pine which are scarcely noticed by the average person. Now that attention is being directed towards replanting, it is high time that we recognize the potential value of these areas having young growth.

Fig. 6. Scrub Oak lands in Walsingham Township.

Fig. 7. General view of the sand hill formation along Lake Huron in Lambton County.

Fig. 8. View of shifting sand in Lambton County waste area.

Fig. 9. Sand dune covering and killing the Red Pine. Some of the trees are covered to a height of about twenty feet.

Fig. 10. Natural reproduction of Red Pine in Lambton County.

Fig. 11. Pine Plains near Angus, Simcoe County.

Situated north of Craighurst and divided between Floss and Medonte townships there is an area of two or three thousand acres of land such as is shown in figure 13. This land lies about a small but very fine body of water known as Orr Lake. This land should be reforested and kept for the people of this locality if for no other purpose than that of a public pleasure ground.

There is another sand area in Simcoe County located in Vespra Township known as the "Midhurst Plains". This waste land is about five miles north-west from Barrie. This tract is about 5,000 acres in extent and is much the same as that shown in figure 13, except that it is very thickly covered with stumps.

Fig. 12. Effects of ground fires on young Red Pine in Simcoe County.

### Northumberland and Durham.

Extending through Northumberland and Durham Counties is a sand formation locally known as the "Oak Ridge" or "Pine Ridge". The following illustration in figure 15 shows the general location of this sand area.

The watershed, as shown in figure 15, is not entirely waste land. The poorest land lies in an area beginning about a mile and a half west of Burketon on the Canadian Pacific Railway, and extends east to the end of Rice Lake, having a width varying from three-quarters of a mile to two miles. The whole of this area is by no means unsuited to agriculture for some good land will be found in isolated areas of small extent. It is safe to say that seventy-five per cent. is wholly unfit for successful farming.

It is of interest to notice in figure 15 the large number of small streams having their origin in these sandy areas. Many of them have almost ceased to exist, except for a short time during spring freshets.

Although few of these streams are large yet they are important for many reasons to the agricultural country through which they flow. They are also

Fig. 13. Orr Lake which lies in waste area in Simcoe County.

Fig. 14. Sand waste in Medonte Township, Simcoe County.

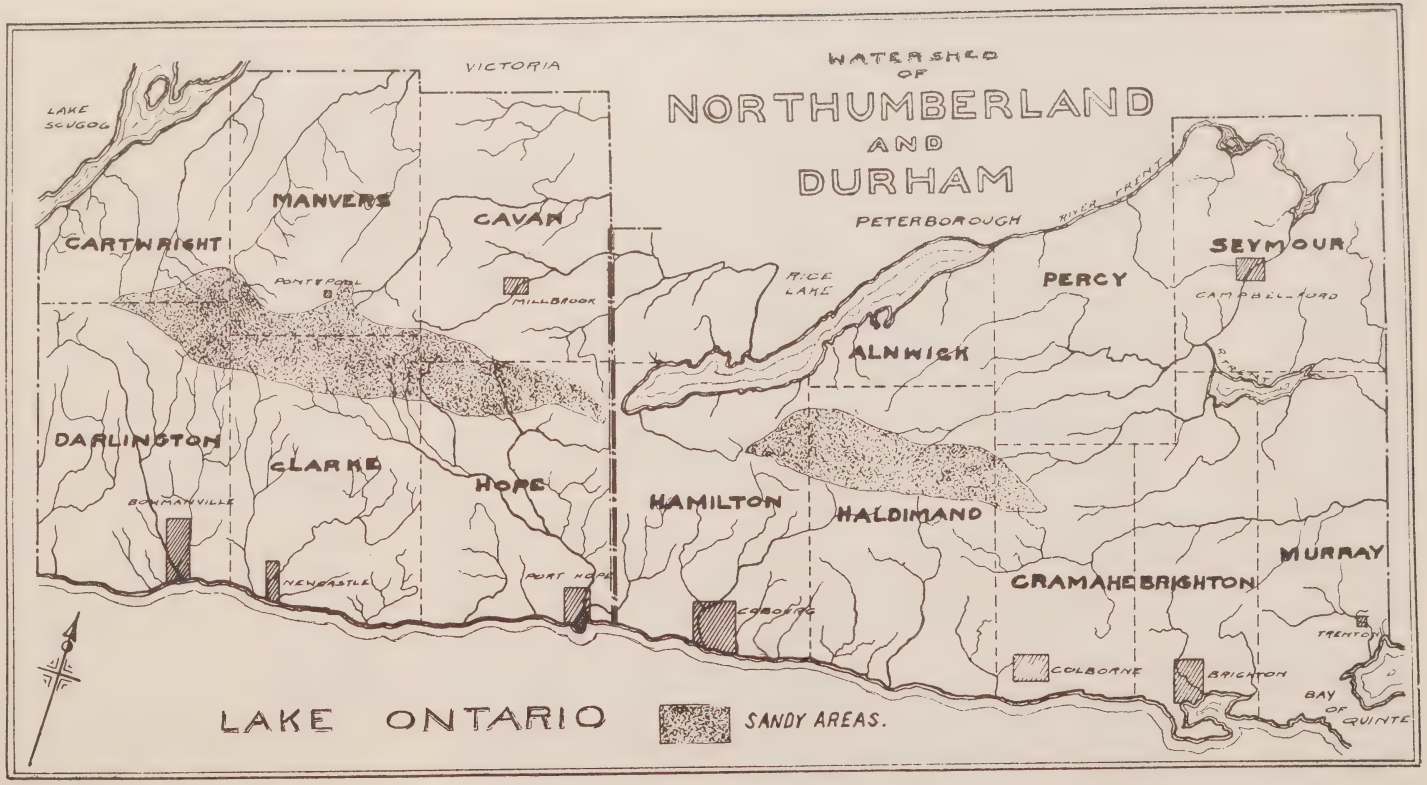


Fig 15. Map showing watershed of Northumberland and Durham in relation to sand lands.

important to many towns in this district as future sources of water supply. I am informed that these streams were originally well stocked with brook-trout. Their value simply as trout streams should prove a strong argument in favour of protecting their sources.

In Durham County, the largest contiguous area of poor land is in Clarke Township. The sandy land here takes in the whole of the tenth concession and the first twenty lots in the ninth concession. In this last concession there is an area of at least two thousand acres totally unsuited for agriculture.

In Northumberland County the largest contiguous area of poor land is in Haldimand Township, where at least 5,000 acres are available.

Other areas might be described in Bruce, Prince Edward and counties in the eastern end of the Province, but the above will give a general conception of existing conditions.

## ARTIFICIAL PLANTING OF FORESTS.

In the following pages it is desired to point out the financial possibility of reforesting at a profit, rather than to discuss the actual methods of planting. In spite of the assertions of so called practical men, that nature will look after the replacing of the forest, the following is certain, that *on large areas where no seed trees of commercial species exist, it will be impossible to obtain satisfactory new growth within a reasonable time.*

In this publication all discussion of reforesting takes the following for granted:

Expenditures in replanting should be made only where there is reasonable fire protection.

At present, replanting should be done only where there is not the slightest chance of natural reproduction of desirable species.

There are two common methods of restocking blank areas with forest trees.

Seeding.—Where the seed is sown or planted directly on the areas to be restocked. This method is frequently adopted with the hardwoods and more especially the nut trees.

Planting.—Where the plant is procured from the nursery and transplanted into the area to be restocked. This method has been found desirable for most species and especially the evergreens or conifers. It is a prevalent opinion in this country that white pine could be easily reproduced throughout waste areas by simply planting or sowing the seed. In Germany and other countries experience points out that the use of the nursery grown plant is preferable, reasons for which space will not allow us to consider at this time. It will be advisable to experiment with artificial seeding, but at present we are concerned chiefly with artificial planting, with the use of nursery grown material.

Conditions may exist where reforestation will be advisable even at an initial loss. Forest planting is frequently done to fix soils on steep slopes or to prevent the development of sand dunes when the initial cost is too high to justify the work as a wood crop investment.

In considering reforesting as a financial investment the subject can be best discussed under the following topics.

Rate of Interest.

Cost of Land.

Cost of plant material.

Cost of planting.
Cost of management and protection.
Taxation.

Rate of Interest.—All expenditures made in producing a crop of trees must be charged against the crop. As a forest crop takes many years to mature, it is necessary to place the initial outlay at compound interest for the period, and also to compound the recurring, annual expenses.

In considering the investments as being under state management the rate of interest will be that at which it is possible for the Province of Ontario to obtain money. At present this rate may be placed a $3\frac{1}{2}$ per cent.

Cost of Land.—The initial cost of the land must be placed at compound interest for the period in which it takes to produce the crop. By the initial cost is meant the soil value without buildings, and without inferior growth or other values which may encumber the land at the time of purchase. At the end of the period the accumulated interest should be charged against the crop, and not the initial cost of land as we still have the soil value after the crop is harvested.

Fig. 16. Type of sand land in Durham County which has been replanted with White Pine and Scotch Pine.

Lands referred to in previous pages can be purchased at prices ranging from two to five dollars per acre for soil value.

Cost of Plants.—Cost of plant material can be considered by taking white pine as an example.

Two year old white pine seedlings, which are suitable for some conditions, can at present be imported from Germany and laid down at points in

Ontario for about one dollar per thousand. Three year old white pine transplants, which are stronger and necessary for certain conditions, can be imported for about three dollars per thousand.

It is quite possible to grow in our own nurseries two year old seedlings for one dollar and fifty cents per thousand and three year old transplants for three dollars and fifty cents per thousand.

It will be preferable to use native grown plants in future work, and the cost can be brought below the above figures. It would be a conservative estimate to place the cost of plant material for the average conditions at five dollars per acre.

Cost of Planting.—Cost of planting depends upon quality of labour and nature of soil to be planted. By spacing the plants about five feet apart in light, sandy soil, it might be possible for two men to plant an acre per day. In rough conditions with uneven surface and considerable obstruction the labour might easily be trebled. For such soil as exists in the waste areas previously described, five dollars per acre would be a safe figure for labour in planting.

Cost of Management and Protection.—Cost of management and protection forms one of the large items to be charged against a forest crop.

It is quite possible for one man to patrol from 5,000 to 20,000 or even more acres of forest land, depending upon topography and other local conditions. The larger the area which can be patrolled by one man, the smaller the acreage cost. If one man has to spend his time protecting 500 acres of forest land it would make the acreage cost very high and would probably make the proposition a bad investment.

Owing to the problem of patrol it can be readily understood that the state or other corporation could not deal with small, detached areas. This question, of the difficulty of protecting small, detached areas, usually makes it inadvisable for private persons to undertake forestry as a separate investment, especially where the tract is a long distance from the owner's residence.

The annual cost of forest administration and protection in Germany varies from twenty-two cents to sixty-five cents per acre. Owing to a more scattered population and other factors our acreage cost will be much smaller. Some estimates have placed this at fifteen cents per acre which is probably conservative enough for the present consideration.

Taxation.—Provincial or "crown lands" in Ontario are exempt, at present, from taxation so that in government management of forest lands it is not entirely necessary to discuss this question. Waste lands, as described in previous pages, are situated in organized communities and certain existing roads will necessarily have to be maintained. These roads will act as splendid fire lines and part of their maintenance should be charged to protection.

For the present discussion a tax will be charged against the forest crop. I will use the township or municipal rate which is imposed for all purposes, including schools. In 1907 this rate was 17 mills on the dollar. The average rate for the last decade was about 16 mills. It may be claimed that this is a high tax rate to apply to forest land, but it will be on the safe side.

In Norfolk County the Charlotteville Township rate for 1907 was 10.9 mills on the dollar. South Walsingham Township rate was 16 mills on the dollar.

In Simcoe County the Tossorontio Township rate for 1907 was 9.9 mills on the dollar. For the Township of Essa the rate was 15.8 mills on the dollar.

In this connection it may be of interest to note the effect on the township revenue, of withdrawing waste lands from the assessment. One hundred acres at $5.00 per acre would give $500.00 of assessable value. With a rate of 17 mills on the dollar, which is a high average for the townships containing such lands, the one hundred acres would pay in taxes $8.50. One thousand acres would pay $85.00 and five thousand acres would pay $425.00 taxes.

Applying this to South Walsingham Township, in Norfolk County, let us estimate what this would mean. South Walsingham in 1907 had a rate of 16 mills and a total assessed value of $882,364. The total taxes imposed for all purposes was $14,078. By withdrawing five thousand acres of waste land at $5.00 an acre from the assessable value, the township would lose $25,000 of assessable property. This would leave assessable property worth $857,364 on which to raise the $14,078 necessary for township expenses. This figures out at a rate of about 17 mills on the dollar. In other words the withdrawing of five thousand acres of waste land would raise the township rate one mill. As a matter of fact much of this land is assessed lower than $5.00.

Estimates of Investment.—Taking one acre of white pine as a unit, it will be of interest to sum up what it will have cost at the end of forty and sixty years.

| | |
|---|---|
| Cost of Land, $5.00, at 3½%, for 40 years | $19 80 |
| Cost of Plants and Planting, $10.00, at 3½%, for 40 years | 39 60 |
| Management and Protection, 15c per year, at 3½%, for 40 years | 10 95 |
| Taxation (rate of 17 mills on the dollar would give an acreage charge of 8.5 cents on five dollar land), 9c per year, at 3½% for 40 years | 6 57 |
| Total | $76 92 |
| Less original cost of land | 5 00 |
| Total expense | $71 92 |

In the above estimate it will be noted that cost of land has been placed at the conservative figure of $5.00 per acre. Much of the land referred to in previous pages will cost less.

From growth studies made in various parts of the white pine region, it is safe to predict that it will be possible to obtain at least forty cords of white pine per acre from forty year old plantations. Forty year old white pine would not be suitable for saw material. The trees would vary from 8 to 12 inches in diameter. Such material is being cut at present in New England, and is worth about $4.00 per cord on the stump. This material is used for box boards, etc., where small dimensions are acceptable.

Estimating forty cords per acre at $4.00 per cord would give $160.00. Deducting the total cost of $71.92 as given above there would be a net revenue of $88.08 after paying 3½ per cent. on all money invested.

Although it would be possible to cut forty year old white pine at a profit, it would pay to allow the trees to stand for a longer period. In sixty years the white pine will have reached saw material size and the following estimate is given:

| | |
|---|---|
| Cost of Land, $5.00, at 3½%, for 60 years | $39 39 |
| Cost of Plants and Planting, $10.00, at 3½%, for 60 years | 78 78 |
| Management and Protection, 15c per year, at 3½%, for 60 years | 29 48 |
| Taxation. (rate of 17 mills on the dollar would give an acreage charge of 8.5 cents on five dollar land), 9 c per year, at 3½%, for 60 years | 17 69 |
| Total | $165 34 |
| Less original cost of land | 5 00 |
| Total expense | $160.34 |

From various growth studies made in the Lake States and elsewhere it is quite reasonable to say that an acre of 60 year old white pine, artificially planted will contain about two hundred trees varying from 12 inches to 24 inches in diameter. Assume that there will be two hundred trees of 18 inches diameter, which is a conservative estimate. This 18 inch tree will cut 400 feet B.M. and the acre would yield 80,000 feet. At a stumpage value of $10.00 per 1,000 the acre would be worth $800.00.

The above estimate does not take into account the thinnings which would come during the period. The $800.00 represents only saw material and there would, without doubt, be a market for the smaller dimensions.

| | |
|---|---|
| Stumpage value for one acre of white pine 60 years old | $800 00 |
| Total cost as shown above | 160 34 |
| Net Profit | $639 66 |

This $639.66 is the same as a yearly rental of $3.25 during the 60 years, being capitalized at 3½ per cent, in addition to the 3½ per cent compound interest on all money invested.

## REFORESTATION IN OTHER COUNTRIES.

The policy of reclaiming, through forestry methods, lands unfit for agriculture, has been in vogue in older countries for a considerable time.

The following figures are taken from "Economics of Forestry," by B. E. Fernow:

In Prussia, during the decade of 1882-1891, some 200,000 acres, waste or poorly wooded, were purchased at an expense of $3,500,000. During the same decade the reforestation of 80,000 acres was affected.

In Prussia during the decade 1891-1900, 170,000 acres of waste lands were added to the state forest lands at the average cost of $10.00 per acre and the budget of 1900 contained $800,000 for that purpose. Bavaria spent about $6,000,000 in such purchases during the last fifty years.

In France, under the reforestation act of 1882, the state has spent in purchases of worn-out lands, in works to check torrents and in reforesting, nearly $20,000,000.

The following is taken from the "History of Forestry," by B. E. Fernow, page 203.

"Centrally located between the valleys of the Loire and Cher near Orleans, lies the region of La Sologne. About the middle of the 19th century 200,000 acres of non-agricultural lands were planted with Maritime and Scotch pine. The cost per acre amounted $5.00. An estimate of the value of

these plantations places it at $18,000,000, so that lands which 50 years ago could hardly be sold for $4.00 per acre, now bring over $3.00 as an annual revenue."

In the United States activity in reforesting is worthy of notice. Several states are buying back waste lands for forestry purposes.

The State of New York has for several years been buying back waste lands and replanting. In 1908, $30,000 was available for nursery work and replanting. In this work the low cost of $6.00 per acre for plants and planting is said to have been attained.

The State of Wisconsin has adopted a definite forest policy, and is segregating its non-agricultural lands at the headwaters of the Wisconsin River. During 1908, 33,880 acres of cut over forest lands were purchased at a low cost of $98,590.

The following is quoted from the "Forestry Quarterly," vol. VI., No. 3;

"As evidence that the artificial reproduction of forests is finding quite general application in coördination with the other lines of forest work, we have only to mention the operations of the Santa Clara Lumber Company and the St. Regis Paper Company, in New York State, as well as of the New York State Forest Commission, which may fairly be claimed to be the result and heritage of the demonstration of the defunct Cornell College of Forestry; the Diamond Match Company, in New England; the Delaware & Hudson, the Pennsylvania, and the Santa Fe Railroads, the Cleveland-Cliffs Iron Company, and several coal and coke companies in Central and Western Pennsylvania. The National Government is also giving increased attention to this work, while several states, notably New York, Pennsylvania, New Jersey, Michigan, Ohio, Massachusetts, and Connecticut are planting extensively on state lands or aiding such work on private holdings."

As a testimony of a private corporation's faith in reforesting, a good example may be cited in the operations of the Pennsylvania Railroad. This corporation employs trained foresters and has adopted a definite forest policy in regard to its waste lands.

In 1907, the total number of trees set out was 315,000. In 1908 about 448,000 seedlings were planted. The latter plantations were made at a cost of $12.00 per arce using purchased plants. By the use of plants from their own nurseries, which have been established, it is expected to lower the cost to about $8.00 per acre.

## HARDWOOD SUPPLIES.

If these areas in Southern Ontario were again placed under forest, it would assist to insure this older part of the Province against a wood famine for its local industries. It probably will not be possible to hold under forest enough land in this region to supply the future hardwood demands. Forest growth must be gradually relegated to non-agricultural soils, and many of these are not suitable to support hardwood growth. There are, however, portions of these waste areas where it will be possible to grow oak, chestnut, ash, etc.

Our northern forests do not produce the hardwoods which to-day are required in the arts. Southern Ontario has been denuded of these valuable woods. It is practically impossible to buy in commercial quantities, in any district in Ontario, white ash, white oak, hickory, etc. An occasional specimen may be found, but our chief supply is to-day imported from the United States and the tropics.

American or soft elm is the chief hardwood now being cut in southern Ontario. Twenty-five years ago it could scarcely be sold for $8.00 per M feet on the stump. To-day it is worth from $22.00 to $30.00 per M feet in car lots.

For the year ending March 31st, 1908, Canada imported $9,953,164 worth of forest products. Some of the important items going to make up this figure are as follows: Oak, $2,173,793; southern pine, $2,170,143; cherry. chestnut, gumwood, hickory, whitewood, $684,252; fence posts and railroad ties, $599,544.

These sources will gradually be closed to us. United States will very soon cease to be a wood exporting country, and the future supply of hardwood for Ontario is indeed a serious problem.

Fig. 17. An abandoned farm in South Walsingham, Norfolk County.

## SOCIAL CONDITIONS.

The policy of segregating and placing under forest management the large bodies of waste land in the southern part of the Province, is safe from a purely financial consideration. There are, however, other economic reasons for adopting this policy.

The story of agricultural settlement in these regions, with its struggles to wrest a living from the soil, and the final abandonment of farms, would call forth facts which alone would prove a strong argument in favour of removing people from such conditions.

During the early settlement on these lands, it was possible for the settler to obtain part of his living through the lumberman's operations. It was the custom to work in the lumber camp in the winter and make an attempt

of farming in the summer. When the lumber industry ceased, it was impossible for him to obtain a reasonable living from the soil. In most cases soil conditions did not warrant agricultural settlement, and the settler frequently went into the district merely to get the lumber.

Many estimable and worthy families have mistakingly settled in these non-agricultural districts. The tendency, upon realizing the hopelessness of farming under such conditions, is to sell out or abandon the farm. Too frequently, however, it is impossible for them to sell the land and find means with which to better their conditions. This last state of affairs presents a sad problem. The most serious situation, however, is that in which the settler makes no struggle to improve his surroundings, but simply drifts, and gradually degenerates along with the land. It is not advisable to describe in these pages, conditions such as actually exist in some parts of Ontario. A knowledge of the social conditions in these non-agricultural areas would of itself be a convincing argument that such lands should be managed only

Fig. 18. An abandoned farm in Charlotteville Township, Norfolk County. Notice the remnants of the wagon gradually being covered with sand.

for forest growth. These districts under attempted agricultural management cannot properly support social organizations, such as schools and churches. The state cannot afford to allow citizens to live and develop under the enforced conditions existing in many of these waste areas.

Rye and buckwheat are two crops common to sand lands, it being possible to grow them where other field crops could not thrive. Figures were collected in the sand lands of Norfolk County in connection with growing rye, and these show one reason why such lands are abandoned. The following is a financial estimate of a rye crop, using *one acre* as a unit. Team and man are figured at the low cost of $2.50 per day:

| | | |
|---|---|---|
| Fall rye produces on this land, an average of 10 bush. to the acre. which at 75c would be | | $7 50 |
| Plowing (man and team plows about 2 acres per day) | $1 25 | |
| Harrow and roll (man and team, about 2 acres per day) | 20 | |
| Seeding (man and seed about 10 acres per day) | 20 | |
| Seed (1½ bush. per acre at 75c) | 1 12 | |
| Cutting | 75 | |
| Threshing (2c per bush., 10 bush.) | 20 | —$3 72 |
| Balance | | $3 78 |

It is quite evident that with this small revenue, which does not take into account all possible charges, there would be a very poor living from farming such land.

## CONCLUSION.

There is, at present, in the old settled portion of Ontario an aggregate of about 8,500 square miles of farmers' woodlands. It is safe to say that there is, in addition to the assessed woodland, another area of 8,500 square miles which is suited only for forest growth. This means that southern Ontario could eventually have over ten million acres of private woodlands.

It is very important that the private landowner be urged and educated to feel the necessity of protecting existing woodlands, and replanting waste areas. This branch of work can be greatly assisted by demonstrating forestry methods on these larger areas. The influence which this policy must eventually exert is shown by looking at the map in figure 1 and noticing the representative way in which these proposed forest reserves are situated throughout Southern Ontario.

Government forest nurseries situated at certain of these points will be able to supply planting material to owners anxious to replant waste land.

In addition to their value as object lessons in forestry methods, these areas should be preserved for the people of Ontario as recreation grounds for all time to come. The need of such areas is demonstrated in the fact that Rondeau Park on Lake Erie has every year thousands of local visitors.

The policy of putting these lands under forest management has many arguments in its favour. It will pay as a financial investment; assist in insuring a wood supply; protect the headwaters of streams; provide breeding ground for wild game, provide object lessons in forestry, and prevent citizens from developing under conditions which can end only in failure.

Respectfully submitted,

E. J. ZAVITZ,

*Professor of Forestry.*

Ontario Agricultural College,
Guelph, March, 1909.

Woodlot at Agricultural College.

Woodlot protected from stock.

Drifting sand land in Norfolk County to be reforested.

# FIFTY YEARS OF REFORESTATION IN ONTARIO

# PART 2

# THE SECOND TWENTY FIVE YEARS

# PROVINCIAL FOREST STATIONS

## Norfolk Provincial Forest Station No. 1

Upon the presentation of the 1908 Report regarding the Waste Lands of Southern Ontario, the government decided to undertake an experiment in reclaiming one of these waste areas. Norfolk County was selected as a suitable location in which to start. Numerous areas of submarginal, sandy lands existed where attempts at farming had failed. A modest beginning was made by acquiring 100 acres, an abandoned farm in South Walsingham, Lot 24, Concession 5. This small start has developed into an area of 2,000 acres composed of forest nurseries, natural woodland and demonstration forest plantations.

A. At the 1908 Station there exist plantations of various ages from 30 to 50 years. Stands of white and red pine, larch and spruce give us data as to rate of growth.

B. Some of the natural woodlands which have been protected and developed contain white and red oak, white ash and other hardwoods. A small saw-mill at the Station utilizes thinnings and other materials for local uses.

The success of these early experiments became an object lesson to many in Southern Ontario and was followed by increasing interest in the reclamation of submarginal lands.

## Norfolk Provincial Forest Station No. 2

Through the results obtained in the 1908 experiment in South Walsingham Township, another area was purchased in 1924. This area, some 2,000 acres in extent, is located in Charlotteville Township on the Lake Erie front, near the village of Normandale. This area, which was known locally as the Normandale plains or desert, was a sand formation which had been cleared and settled in the early 1790's. The settlers who reached this region in those early days found a soil which was easily tilled. When we first visited the Normandale plains there were still remains of old orchards and plow furrows, nearly obliterated by scrub oak and blowing sand. (Fig. 1)

This was a region replete with historical events but which with the passing years became abandoned to become a waste area.

Norfolk Forest Station. Plantation of Red and White Pine, planted in 1910.
Walsingham Township, Lot 5, Concession 24. (Fig. 1)

Fig. 2. Norfolk Forest Station. Thinning being made in 1954 of a 30-year-old Red Pine Plantation.

Fig. 3. White Pine Plantation in 1954. Planted in 1910. Thinnings have been made.

In 1669-70 the French Missionaries on their way to the West spent the winter here, describing it as "the earthly paradise of Canada". ("Exploration of the Great Lakes by Dollier de Casson and Brehaut de Galinee." Translated by Dr. Coyne, Ontario Historical Society, Vol. IV). In 1795 Governor Simcoe visited this settlement and during his visit chose the site of the town of Charlotteville which was to be the capital of the District of London. The Courts of the District of London, 1802-1816, were held in a hotel which had been erected by Job Loder on the new townsite. In 1812, fearing an American invasion, a fort was built on the bluff above the lake.

With the passing years and the development of settlement to the north, the Townsite of Charlotteville gradually disappeared and when the government decided to reclaim the area - 125 years later - it was found to hold Crown lots in the old townsite.(Fig's. 4 & 5).

Fig. 4. Road in the Normandale plains. Photo taken in 1905. In 1800 this was the main road known as the Fredericksburg Road, leading north from Normandale on Lake Erie.

Fig. 5. Same road reclaimed. Photo 1945.

Provincial Stations (continued)

Midhurst Forest Station, Simcoe County

The Forest Station in Simcoe County was established in 1922. It now contains 2,800 acres composed of 350 acres of nurseries, plantations and a Park under the Parks Branch.

Located in a County with extensive areas of submarginal lands it was the source of forest nursery stock to supply the needs of municipal programmes and that of private landowners desirous of carrying out reforestation plans.(Fig's. 6 & 7).

Orono Forest Station

The Orono Forest Station was established in 1922 in Northumberland and Durham Counties. Its location in Central Southern Ontario, with large areas of submarginal lands, made forest nursery stock available within easy reach.

The Orono Station has 1,000 acres, some 300 acres devoted to nurseries, and the remainder in demonstration plantations.

THE G.. HOWARD FERGUSON FOREST STATION

The G. Howard Ferguson Station at Kemptville, Ontario, was established in 1946, filling a much needed forest nursery for the eastern part of Southern Ontario. It contains 1500 acres with 300 acres in nurseries and the remainder in demonstration plantations.

THE FORT WILLIAM FOREST STATION

This station was purchased in 1946. It contains 530 acres of nurseries and demonstration forest plantations. It supplies the need for the northwestern end of the Province.

Fig. 6. Midhurst Forest Station 1925. Plantations of Red Pine 2 years old.

Fig. 7. 30 year old Red Pine plantation. Photo 1956. Thinned and pruned.

## MUNICIPAL FORESTS

In 1911 the Ontario Legislature passed an Act entitled "The Counties Reforestation Act". Since then amendments have been made expanding its purpose.

The above Act is now included in what is known as "The Trees Act" (R. S. O. 1950). Under this any municipality may purchase the land, carry on development and management of these areas, and either enter into an agreement with the Crown, or carry out the planting and management of the forest without the agreement. All by-laws pertaining to the purchase, management or subsequent sale of such lands require the approval of the Crown, as represented by the Minister of Lands and Forests.

The agreement provides that the provincial Government will assume the responsibility for re-establishment and care of the forest for a stated period of years (usually fifty in recent agreements). At the end of the agreement period, the municipality may renew the agreement, or it may take over the project by paying to the Crown the cost of the development without interest; revenue received by the province during the agreement period is credited to the project. A third choice open to the municipality is to relinquish title to the land and receive its original purchase price.

### The Hendrie Forest

In 1922 the County of Simcoe was the first to take advantage of this legislation by purchasing one thousand acres of waste land in Vespra Township, now known as the Hendrie County Forest. Since 1922 the Hendrie forest has grown to have an acreage of 3,317. (Fig's 8 & 9).

Fig. 8. The first 1,000 acres of land purchased by Simcoe County as a Municipal Forest in 1922. Became the present Hendrie Forest of 3,317 acres.

Fig. 9. The Hendrie Forest from an aerial view with inset of interior of Red Pine stand.

## The Orr Lake Forest

On page 15 of the 1908 Report is an illustration showing the waste land around Orr Lake in Simcoe County, taken in 1906. Today this forest has an acreage of 1,716 acres, seen from Highway 93. (See Fig. 13). Simcoe County has municipal forests totalling 15,014 acres, as of 1959. The older plantations are producing pulpwood in the form of thinnings. (Fig's 10 & 11).

## The Larose Forest

At the eastern end of the province the United Counties of Prescott and Russell began purchasing submarginal land in 1928 for a reforestation programme. Today this forest has grown to 23,000 acres. It is known as the Larose Forest, named for the late Ferdinand Larose who was the Agricultural Representative for that district, and through whose foresight the successful development of this project came to fulfilment. (Fig's 12 & 13).

In the life of a plantation several thinnings may be obtained. These will have an increasing financial value.

In a 21 year old red pine plantation of the Larose Forest a thinning of one-quarter of the stand produced 6.6 cords of pulpwood per acre, giving a net profit of two dollars and fifty cents a cord.

A 31 year old plantation of red pine was cruised, showing 50 cords per acre, the stand being 50 to 60ft. in height. If cut clear at the present time it would give a net profit of $180. per acre.

We have sescribed the development of municipal reforestation in two of the counties that embarked on the program in its earliest years. Today, 22 counties and 6 townships have entered into Agreement with the Province for the promotion of the plan under The Trees Act. Under this Act municipalities are enabled to acquire land for reforestation purposes without entering into Agreement for Management.

Following is a list of municipalities, counties and townships having municipal forests:


83°
82°
81°
80°
46°
45°
44°
43°
42°
Sudbury
ALGOMA
SUDBURY
Manitoulin Island
Gore Bay
PARRY SOUND
Parry Sound
MUSKOKA
Bracebridge
LAKE HURON
GEORGIAN BAY
BRUCE
Owen Sound
MIDHURST
15,014
Barrie
Lake Simcoe
ANGUS
1,800
14,656
Walkerton
GREY
6,668
SIMCOE
2,042
DUFFERIN
Orangeville
3,472
YORK
PEEL
Brampton
Toronto
Goderich
1,339
HURON
WELLINGTON
Guelph
1,545
HALTON
Milton
710
WATERLOO
PERTH
Stratford
Kitchener
889
Hamilton
WENTWORTH
733
50
Woodstock
Brantford
280
MIDDLESEX
OXFORD
BRANT
Cayuga
HALDIMAND
UNITED STATES
Sarnia
LAMBTON
London
Simcoe
NORFOLK
St. Thomas
ELGIN
ST. WILLIAMS
100
KENT
Chatham
LAKE ST CLAIR
Sandwich
ESSEX
LAKE ERIE

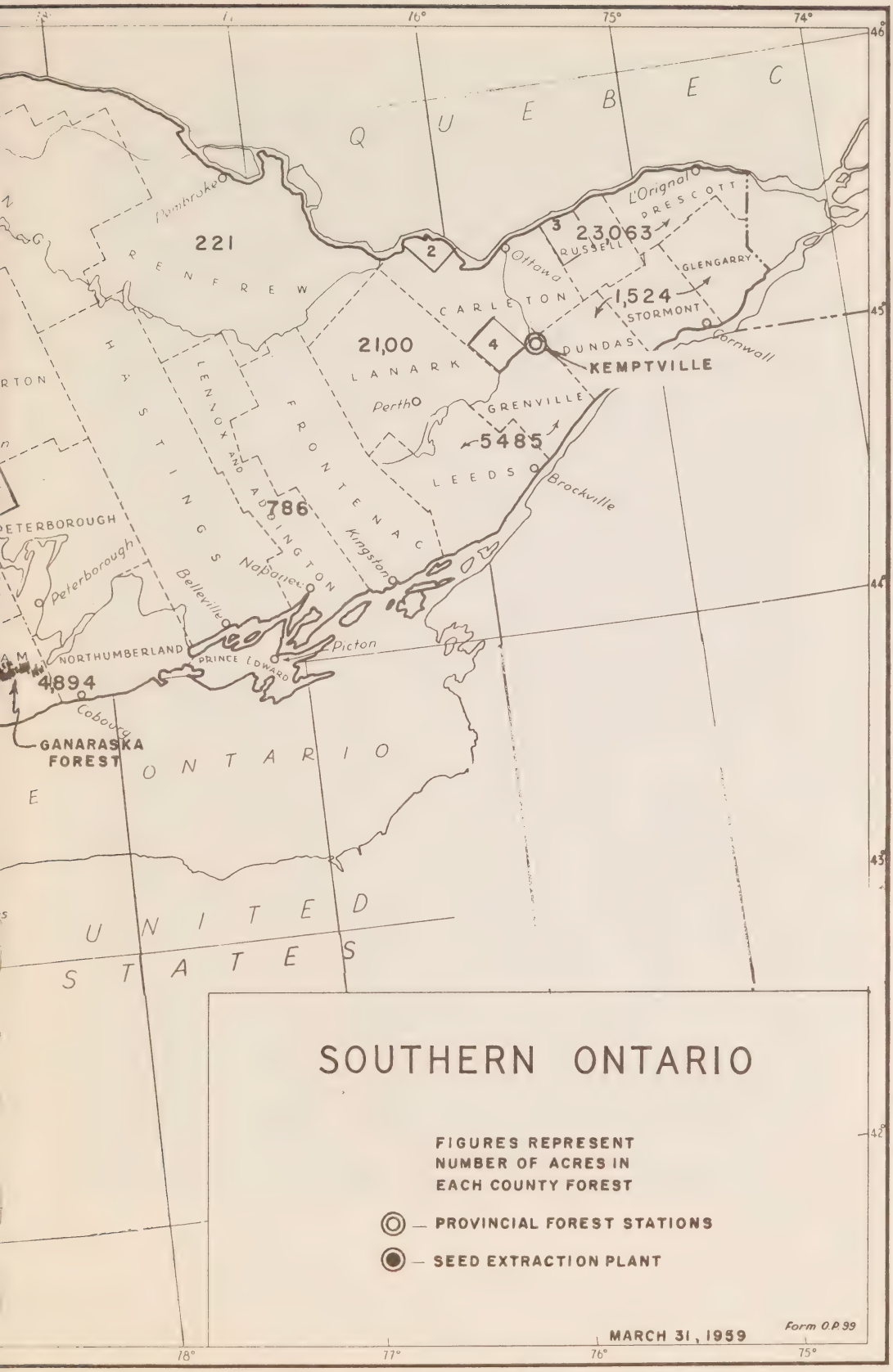
16°
75°
74°
46°
45°
44°
43°
42°
18°
77°
76°
75°
QUEBEC
UNITED STATES
ONTARIO
Pembroke
L'Orignal
PRESCOTT
221
RENFREW
2
Ottawa
3
23,063
RUSSELL
GLENGARRY
CARLETON
1,524
STORMONT
Cornwall
21,00
LANARK
4
DUNDAS
KEMPTVILLE
Perth
GRENVILLE
5485
LEEDS
Brockville
HASTINGS
LENNOX AND ADDINGTON
FRONTENAC
786
Kingston
Napanee
Belleville
Peterborough
PETERBOROUGH
NORTHUMBERLAND
PRINCE EDWARD
Picton
4,894
Cobourg
GANARASKA FOREST
SOUTHERN ONTARIO
FIGURES REPRESENT NUMBER OF ACRES IN EACH COUNTY FOREST
— PROVINCIAL FOREST STATIONS
— SEED EXTRACTION PLANT
MARCH 31, 1959
Form O.P.99

Fig. 10. Orr Lake Forest, 1,713 acres, 1957. On page ___ of the 1908 Report is a photo of Orr Lake in 1906. This area has since been reclaimed and may be seen from Highway 93.

Fig. 11. Orr Lake Forest 1956. Thinnings of poles and pulpwood ready for shipment. Cut from a 21-year-old plantation.

Fig. 12. Larose Forest 1959, 23,000 acres. Pulpwood ready for shipment. Thinnings were made of 6.6 cords per acre.

Fig. 13. Larose Forest, 1959. Cutting thinnings into log lengths.

## County Forest Areas Under Agreement

| COUNTY | Date of Agreement | Number of Acres as of Mar. 31, 1960 |
|---|---|---|
| Brant | Nov. 15, 1952 | 50.00 |
| Bruce | Jan. 20, 1950 | 14,656.35 |
| Dufferin | Nov. 26, 1930 | 2,042.00 |
| Grey | Dec. 31, 1937 | 6,668.08 |
| Halton | Mar. 14, 1950 | 1,245.63 |
| Huron | Nov. 27, 1950 | 1,339.00 |
| Kent | Dec. 21, 1953 | 76.98 |
| Lanark | Jul. 5, 1940 | 2,100.00 |
| Leeds & Grenville | Apr. 24, 1940 | 5,485.50 |
| Lennox & Addington | Apr. 3, 1952 | 786.00 |
| Middlesex | Mar. 8, 1954 | 280.00 |
| Northumberland & Durham | Apr. 20, 1955 | 4,877.00 |
| Ontario | Jul. 9, 1930 | 1,800.00 |
| Oxford | Sep. 1, 1950 | 716.56 |
| Prescott & Russell | Dec. 22, 1948 | 22,213.83 |
| Renfrew | Dec. 26, 1951 | 221.00 |
| Simcoe | Nov. 25, 1949 | 15,013.69 |
| Stormont, Dundas & Glengarry | Sep. 29, 1949 | 1,524.45 |
| Victoria | Aug. 10, 1929 | 7,044.00 |
| Waterloo | Apr. 17, 1950 | 710.48 |
| Wentworth | Nov. 27, 1952 | 889.30 |
| York | Sep. 25, 1952 | 3,772.08 |
| | Total: | 94,511.93 |

| TOWNSHIP | | |
|---|---|---|
| Bonfield | Apr. 1, 1952 | 60.00 |
| Charlottenburgh | Apr. 1, 1955 | 175.00 |
| Cumberland | May. 29, 1952 | 808.44 |
| Galway & Cavendish | Nov. 1, 1952 | 100.00 |
| Marlborough | Sep. 21, 1953 | 200.00 |
| Torbolton | Mar. 28, 1953 | 430.80 |
| | Total: | 1,774.24 |
| | Total: | 96,286.17 |

## County Forest Areas Not Under Agreement

| | |
|---|---|
| Lambton | 670.00 |
| Norfolk | 2,100.00 |
| Wellington | 1,143.00 |
| Total: | 3,913.00 |

## RIVER VALLEY CONSERVATION AUTHORITY FORESTS

Conservation Authority Forests are those where a group of Municipalities are affected by the conditions existing on the watersheds within their boundaries.

The Conservation Authorities Act enables them to organize under an Authority to improve and remedy injurious conditions.

One of the important phases is that of reforesting the watersheds to conserve water, prevent erosion and prevent or ameliorate floods.

The Department of Lands and Forests, under "The Trees Act" is enabled to enter into Agreements with the Authorities, similar to those with single Municipalities.

Previous to the passing of the Conservation Authorities Act a conference was held at the Ontario Agricultural College, Guelph in the spring of 1941, for the purpose of developing a programme in connection with the conservation of our natural resources. Subsequent to this meeting the Dominion and Ontario Governments agreed to collaborate in a sample or "type survey of a watershed". The Ganaraska Watershed (See 1908 Report, page 16) in Durham and Northumberland Counties, was decided on as a suitable area for the survey which was carried out and completed by 1943. (See The "Ganaraska Watershed Report" by A. H. Richardson, published by the Ontario and Dominion Governments, 1944).

Extending through York, Ontario, Northumberland and Durham Counties is an outcropping of moranic ridges which form the watershed between Lake Ontario and the region to the north. (See Map in the 1908 Report.)

By 1930 Municipal Forests had been established in all of the above Counties.

We quote from Dr. R. C. Wallace of Queens University, in his introduction of the Ganaraska Watershed Report, 1943:

"Recent observations show that in spite of the expanded conservation programmes of the government in recent years, the submarginal areas are growing larger, the water in streams and wells is becoming less, and erosion of different types, including topsoil washing on agricultural land, is increasing. At the present rate at which remedial measures are being applied, it is estimated that it would take several hundred years to deal with the problem."

The Ganaraska Watershed which eventually should be under forest, contains about 20,000 acres. At the present time the Authority forest is 7,292 acres, while the Northumberland and Durham forest, which is a part of the watershed, has an acreage of 1,409 acres.

Since the Ganaraska Agreement of 1947, some 4,000,000 trees have been planted. (Fig's 14 & 15).

Conservation Authority
Forest Areas Under Agreement

| CONSERVATION AUTHORITY | Date of Agreement | Number of Acres as of Mar. 31, 1960 |
|---|---|---|
| Ausable River | Dec. 13, 1951 | 3,069.00 |
| Big Creek Region | Dec. 2, 1954 | 1,765.00 |
| Ganaraska River | Jan. 31, 1947 | 7,511.00 |
| Grand Valley | Mar. 18, 1952 | 4,023.69 |
| Metropolitan Toronto & Region | Apr. 11, 1951 | 1,522.00 |
| Middle Maitland Valley | Apr. 1, 1955 | 466.00 |
| Moira River | Nov. 28, 1951 | 7,265.00 |
| Napanee Valley | Oct. 28, 1954 | 4,485.00 |
| Neebing Valley | May 15, 1958 | 1,030.70 |
| North Grey Region | Jun. 25, 1958 | 1,996.00 |
| Otter Creek | Apr. 26, 1957 | 665.00 |
| Sauble Valley | Sep. 23, 1959 | 1,580.00 |
| Saugeen Valley | Dec. 15, 1952 | 8,398.00 |
| Upper Thames River | Apr. 11, 1951 | 3,249.56 |
| | Total: | 47,025.95 |

Fig. 14. Ganaraska River Authority Forests. Acreage 7,292 acres. Potential area 20,000. Eroded and sandy area planted.

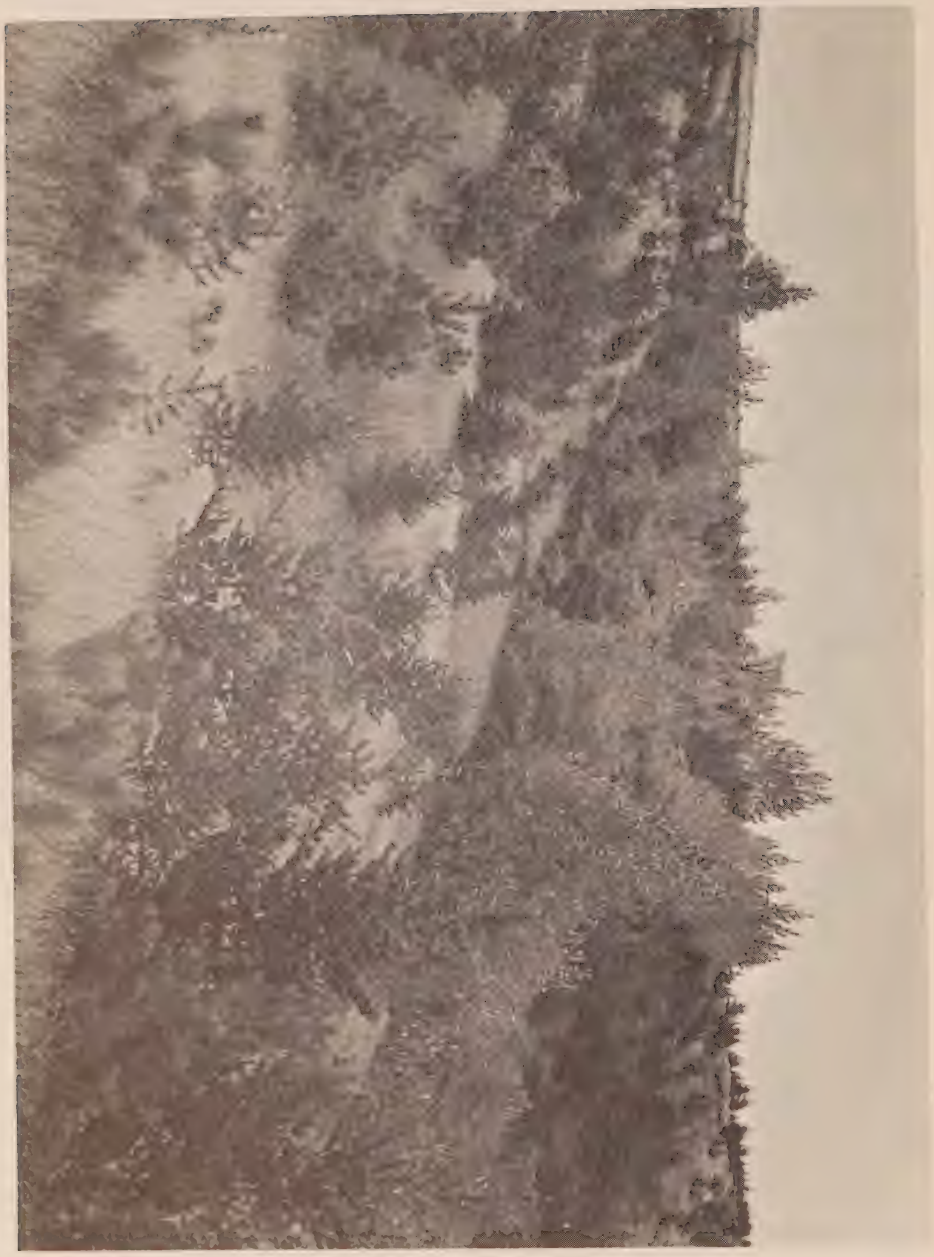

Fig. 15. Ganaraska Forest area planted in 1948. Photo in 1954.

## CROWN LAND REFORESTATION

By 1928 Northern Ontario had been organized into Districts with Foresters in charge. Fire protection had reached a stage where some suitable areas existed in which demonstrations could be tried to restock these areas which, through fire or clearing, had left no chance of natural reproduction. This was especially true of sandy plains which existed in many districts.

In 1928 a circular letter was sent the districts to suggest suitable areas for demonstration planting. In reply to the circular F. A. MacDougall, then District Forester at Sault Ste. Marie, suggested the Kirkwood desert, a township north of Thessalon. Kirkwood Township was one of several townships from which the forest had largely disappeared. Planting was begun in 1928 and by 1943, 6,000 acres had been restocked. (Fig 16).

The Kirkwood reforesting experiment had proven itself and on November 2, 1943, additional areas of 14,000 acres were added and set apart as the "Kirkwood Forest Management Unit". Orders-in-Council in 1946 and 1948 have made small changes but the area is now over 20,000 acres. While Crown Land planting for demonstration purposes has been carried on in Parry Sound, North Bay and Pembroke districts, we have used the Kirkwood example as outstanding.

It is felt that the Kirkwood Forest Management Unit consisting of 20,000 acres will prove to the people of Ontario that our forests can be manages as a crop with ever-increasing sources of revenue.

To date over 15 million trees have been planted on 16,149 acres of this Management Unit and returns are beginning to come in on the older plantations as thinnings in the form of pulpwood. (See photo) (Fig. 17).

In the management of the Kirkwood forest there will be periodic thinnings of pulpwood and poles which will accrue in revenue. At the end of this publication will appear a statement as to the value of these periodic returns.

## CROWN LAND REFORESTATION

The reclamation of waste lands in Southern Ontario had reached an encouraging impetus by the 1930's. Then in the period 1954 to 1958 several new forest nurseries were started in Northern Ontario and the reclamation of cut-over and burned areas began.

The potential production of all provincial nurseries is at least 100 million trees. At present the production has reached around 50,000,000.

In the 1920's a study was made of the acreage production of the pineries of the Laurention Shield. It was estimated that average 36-mile townships cut about 30 million board feet of lumber. Using 100 years as an average age, it was found that one acre produced 1,500 board feet or 15 board feet per year. (In Minnesota Pineries the average was 2,000 board feet per acre). As compared to our original forests a well managed forest such as the Kirkwood Forest will produce 30,000 board feet in 60 years, or 500 board feet per year.

Fig. 16. A view of the Kirkwood desert area which now forms part of the "Kirkwood Forest Management Unit" of 20,000 acres, being reclaimed. The Management Unit is now producing poles and pulpwood.

Fig. 17. Hauling thinnings from the Kirkwood Forest in 1956. Planting was started in 1928, some 28 years previous.

## PRIVATE FOREST PLANTATIONS

The distribution of forest nursery stock to private landowners was started in 1095. Ten thousand imported white pine and norway spruce were sent out to Norfolk and Durham counties. On page 18 of the 1908 Report is a picture of white pine in a sandy field in Darlington township, Durham County planted in 1905. See picture of these same trees fifty years later (Fig. 19). The small forest tree nursery was organized in 1904 at the Ontario Agricultural College, Guelph. At first, seedlings were imported from Germany. These were lined out and developed for distribution, usually in one to two years. In those early years, one year old Scotch Pine cost seventy-eight cents per thousand f.o.b. Hamburg, Germany, and about one dollar and fifty cents laid down at Guelph.

Seed collection was organized in 1906 and the importation of live plants gradually ended. The oldest red pine plantations were from seed collected on the Angus plains, Simcoe county, now largely taken over as Camp Borden.

In a census made in 1945 by G. H. Bayly, it was shown that a very small percentage of the hardwoods distributed had resulted in successful plantations. This was owing to lack of knowledge in regard to soil sites and species to use. In the early years landowners secured little personal inspection or guidance by forest officials. Today with trained foresters in Ontario any major project of reforestation should have direction and advice. The Department of Lands and Forests through its many District offices are able to assist in such matters. During the past 50 years the tree distribution has grown from ten thousand in 1905 to over thirty three million last year, 1959.

Fig. 18. White Pine planted in 1905 in a sandy field in Durham County.

Fig. 19. 1905 Plantation of White Pine in 1959, fifty-four years later. Trees of 10 to 14 inches diameter.